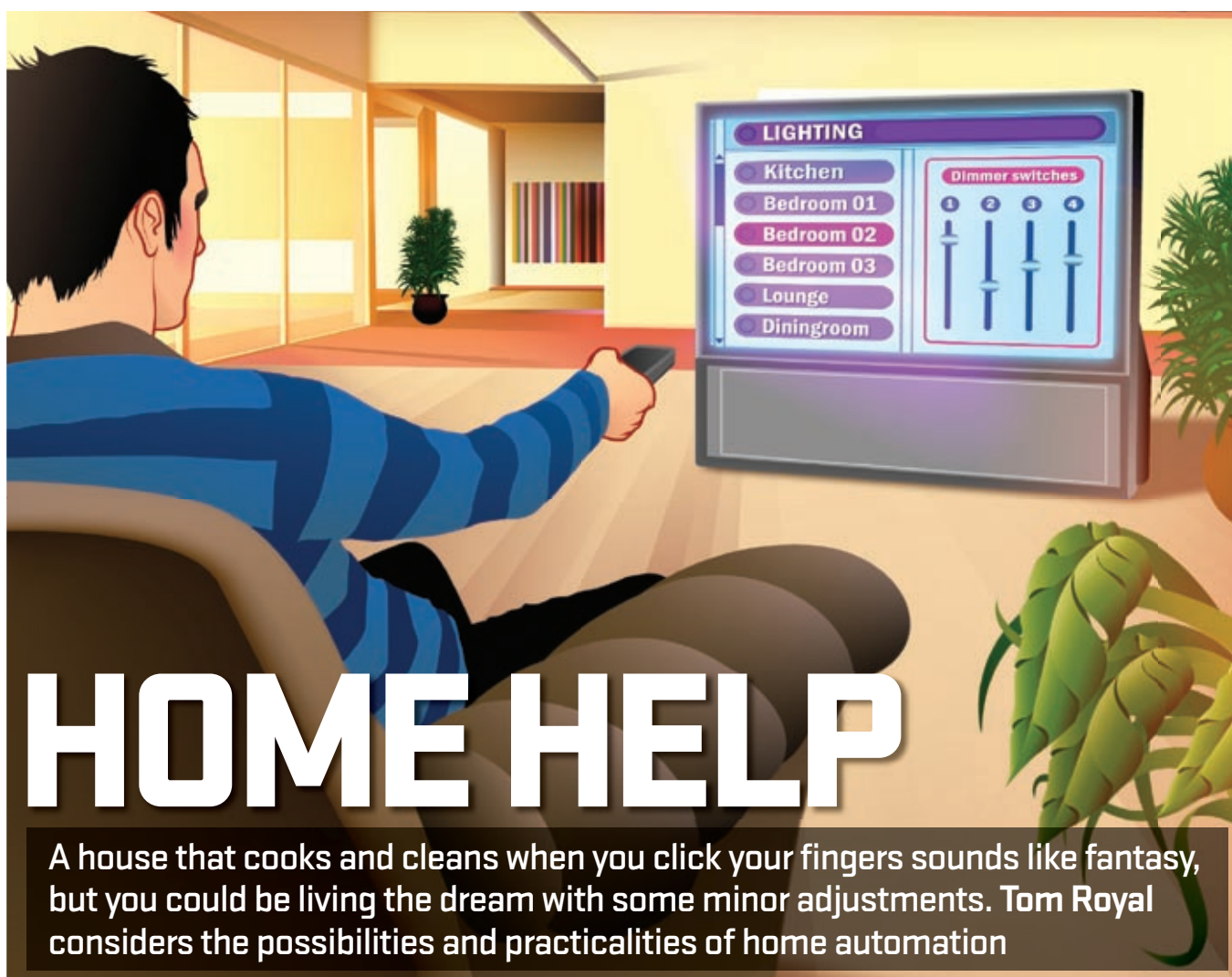




HOME HELP

A house that cooks and cleans when you click your fingers sounds like fantasy, but you could be living the dream with some minor adjustments. Tom Royal considers the possibilities and practicalities of home automation

Anyone who grew up watching an unhealthy amount of television can't help but be disappointed by the world we live in today. For decades, children's television shows have depicted the home of the future as a maintenance-free idyll manned by helpful robots and scary-looking labour-saving devices that remove the need to do any cooking or cleaning yourself. Rather than doing the washing up, citizens of the future are always portrayed standing in line for the next rocket ship to the moon.

Here in the headily futuristic year of 2006, the closest we've come is the invention of the Dyson root-cyclone vacuum cleaner, a device that sounds vaguely futuristic but still has to be pushed around for hours, and the food processor, which is ideal for converting ingredients into a nutritious but greenish sludge. George Jetson had a rocket car that could fold up into a briefcase; we have the Fiat Punto. Where did we go wrong?

HOME COMFORTS

The truth is that there are several technologies designed to help make home life less arduous, but most of us have never heard of them. If you're building a new home, you could add a computer control system by wiring Ethernet ports into every room and connecting them to a server PC that's hidden away. If you want to add a space-age feel to your existing house, though, the idea of draping wires everywhere is probably less than appealing.

Wireless networks can be useful, but it can be hard to cover an entire property, and security is a concern. A passer-by hacking into your wireless internet connection could be legally dangerous, but the same hacker switching your lights on and off all day could drive you insane. One alternative is a little-known technology called X10 automation.

X10 was developed in the 1970s by Scottish company Pico Electronics. It is common in the USA, where it is sold in Radio Shack stores, but despite its local origins it is rare in the UK. It is a type of Power Line Control (PLC) technology, as it uses existing electrical wiring to transmit signals to devices around the home. This makes it ideal if you want to add a system to your house without extensive rewiring. It is also inexpensive. An X10 lighting controller costs less than £25, and a computer controller that interfaces with your PC is less than £30 from www.simplyautomate.co.uk.

The key to any home automation system is that it should make your life easier. It should be easy to install, easy to use and require as little maintenance as possible. With this in mind, we decided to conduct an experiment to find out how easy it is to turn a normal home into the interactive home of the future. Or, failing that, one with clever light switches.

LIGHT RELIEF

One of the simplest applications for X10 technology is controlling the lights in your house. For our first test, we decided to see

how easy it would be to create a system where all our lights could be turned off and on using a single remote control.

An X10 lighting system works using two types of communication. When you push a button on the remote control, it sends a radio signal to a transceiver. This transceiver is plugged into a mains power socket. It takes the radio signal and converts it to a code that is sent down the electrical wiring of your house. Finally, this signal is detected by a lighting controller, which turns on the light.

There are two key areas in which problems could occur. First, the radio signal from the remote control might not get through to the transceiver. This could be because of interference from another device, or because it's too far away from the transceiver.

Second, the signal sent down the electrical



▲ X10 modules communicate through your electrical wiring to control your appliances



wiring could be disrupted. Some devices, such as computer power supplies, can impede the X10 signals. Before you even think of rewiring your house, it pays to do a little testing.

To test the system, we used a standard X10 transceiver, a keychain remote control and a plug-in light module. These cost £55 including VAT from www.simplyautomate.co.uk, who also supplied all the other X10 equipment we used in our test. We plugged the transceiver into a socket in the centre of our flat and plugged the light module into a socket in the living room. We then plugged a standard lamp into the light module. Pushing the '1 on' and '1 off' buttons on the remote control turned the lamp on and off straight away. Before continuing, we checked that the remote control worked in every room and repeated the test with every electrical appliance we could think of switched on.

We also turned on our wireless network to find out if that disrupted the remote control signal. To our surprise, it still worked perfectly. We tested the light module in a few other sockets but encountered no difficulties.

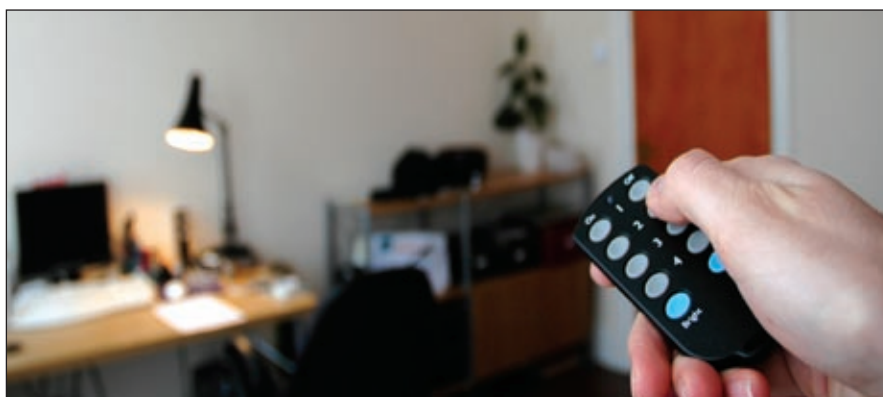
If you're not so lucky, you can take steps to rectify the problem. If you identify an appliance that is interfering with the signal, you can buy a plug-in filter that suppresses the interference. These cost around £23 including VAT. You might also need to move the transceiver around your home until you find a location that enables the remote control to work in every room.

CODE OF CONDUCT

The next step is to do a little planning. X10 operates using a system of codes: one house code and one unit code. The house codes allow several systems to operate in close proximity without interfering with one another. Unless a neighbour also uses X10, you should be able to stick with the default setting, which is A.

Unit codes are used to distinguish between devices, so you'll need to assign one to each light that you want to control. There are 16 unit codes, which should be plenty for most users. If you need more, you could divide your system up and use two or more house codes, as each house code has its own 16 unit codes.

It's important that you plan your unit codes in advance. X10 remote controls can control several different unit codes, but they are usually restricted to sequential codes. For example, a four-way remote control could control units one to four, or five to eight, but not units one, three, five and eight. For our test, we drew up the following list of codes:



▲ X10 lets you control the lights in your home remotely without the need for extensive rewiring

- A1 Lounge lights
- A2 Hall lights
- A3 Kitchen lights
- A4 Bathroom lights
- A5 Bedroom lights

This will allow a single three-way switch by the front door to control the three most commonly used lights: those in the lounge, the hall and the kitchen. A second three-way switch in the kitchen could control lights in the kitchen as well as the two nearest rooms, the bathroom and the hall. The bedroom light would be controlled remotely from next to the bed, making it ideal for the truly lazy.

You can use different kinds of light modules. The simplest option is to use plug-in modules. These fit directly into a bayonet or screw-light fitting, so they're easy to install. To use them, simply leave each light switch turned on and control the lights using an X10 remote control. These fittings cost less than £20 each including VAT.

The second solution is neater but requires a lot more work. X10 controllers are available that replace your existing light switches. With these installed, you can control the light by touching the switch as you would normally, or by using a remote control. Two types are available: switches and dimmers. The standard X10 switch has three connections: live, switched live and neutral.

As we were rewiring a fairly old building, we opted for the LW10U dimmer switch, which does not need a neutral connection to operate. Each dimmer costs £23.50 including VAT, but www.simplyautomate.co.uk offers bulk discounts if you buy several at once. We got four, one each for the lounge, hall, kitchen and bedroom. These

dimmers are suitable for incandescent lights only; they're not suitable if you use low-voltage halogen or fluorescent lights.

DOWN TO THE WIRE

Installing the dimmers was easier than we expected. They fit into a standard wall box, so after isolating the power and removing the existing switch it's simply a matter of connecting two wires, one to the power and one to the light, then fitting the new switch to the wall. We encountered only two problems.

First, our test flat has a set of lights in the hall that can be controlled by two switches, one at the top of the stairs and one at the bottom. The wiring for this kind of system is a little more complicated than that for a simple switch. We had to disconnect the wires running to the secondary switch, remove that switch and replace it with a blanking plate, then wire the X10 switch to the wall where the upstairs switch used to be. If you're not absolutely confident about how your electrical wiring works, consult an electrician. Guesswork can be time-consuming and even deadly.

Second, the X10 switches are thicker than standard ones. This means the normal bolts that hold a light switch in place are too short to hold an X10 switch. Each X10 switch comes with two long bolts included, but these proved far too long to fit into the wall boxes in our property. We consulted a local DIY store, where an expert helpfully told us, "Ooh, that'll be a pain". Not surprisingly, he was absolutely right. Cutting the bolts to size required a hacksaw, a pair of pliers and the patience of a saint. It took an hour, two hacksaw blades, a tea towel (it's best not to ask) and a first aid kit before we were ready to continue.

Safety first Home automation precautions

Connecting X10 automation equipment in your home is quite straightforward, but it does involve working with mains electricity, so it's essential that you take some safety precautions.

✓ First and foremost, do not attempt to fit X10 switches unless you are confident that you have the necessary skills. As a general guide, if you would be happy to fit a new light switch or plug socket, you should have no problem fitting X10 equipment. If you would not feel confident fitting a normal switch or socket, get a qualified

electrician to fit any X10 products for you.

✓ Before you try any work, turn off the mains power to your house at the switch box and check there is no power to the lights before continuing. Have a good torch handy so you can see what you're doing properly once all the lights are out.

✓ After opening existing light switch covers, test all the wires inside with a mains testing screwdriver to make sure they're no longer live. Work slowly and methodically. Make sure the switches are properly secured and that all live wires are concealed before you switch the power back on. If at any point you are not

sure what to do, stop and consult an electrician.

✓ Under legislation introduced in 2005, certain home electrical work can legally be carried out only by a "competent person". To make sure you do not fall foul of these rules, visit the website at www.odpm.gov.uk/index.asp?id=1130907.



Flicking the switch Fitting an X10 light dimmer

1 After turning off the power (see our Safety First box on the opposite page), remove the existing light switch plate. Check each wire behind it with a mains test screwdriver. If any are live, stop immediately.



2 If all the wires are safe, unwire the existing switch and remove it from the wall. Connect the live and switched wires to the terminals on the rear of the X10 light dimmer. These switches have no neutral connection.



3 Being careful not to trap or damage the wires, screw the X10 dimmer into place. You may need to trim the bolts that are included if they are too long for the wall box. Fit plastic caps over the bolts.



Installing all four dimmers took just over two hours, including hacksaw time. Once they are secured, small dials concealed behind the switch enable you to set the house and unit codes. With our switches set to A1, A2, A3 and A5, the entire system worked as planned.

The keychain remote control we used for testing operated switches A1, A2, A3 and A4 straight out of the box. As soon as we turned the power back on, it could control our lounge, hall and kitchen lights. This is convenient, but we no longer had a light switch at the bottom of the stairs next to the front door.

To rectify this, we used a Stik-A-Switch. These cost just under £17 including VAT from www.simplyautomate.co.uk and allow you to operate three lights. They work as a battery-powered radio remote control, so there's no need to wire them up. We fitted one by the front door so we could turn off the hall, kitchen and lounge lights before leaving home.

The one serious difficulty we faced when setting up X10 lighting was controlling the bathroom light. Building regulations stipulate that a bathroom light must be controlled either by a normal switch outside the bathroom or a pull-cord inside the room. A switch outside the bathroom would be easy to replace with a standard X10 dimmer. As our flat had a pull-cord, though, this wasn't an option.

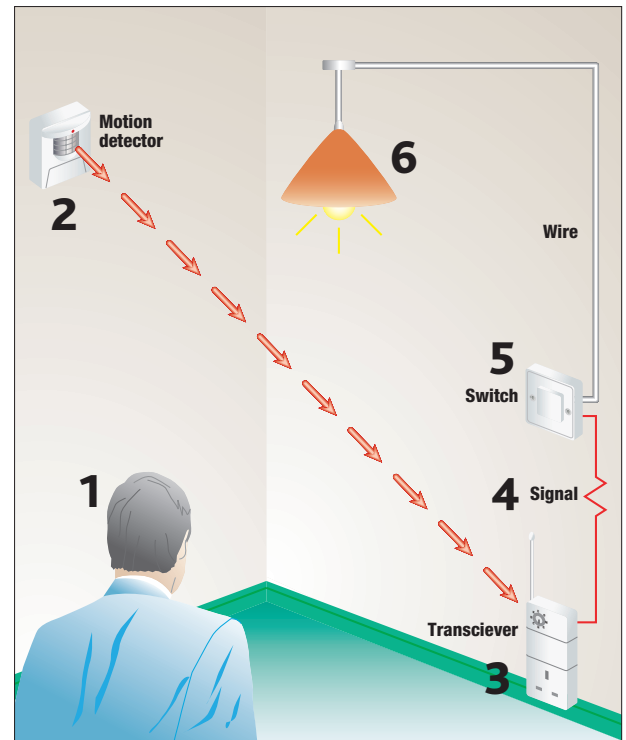
Most pull-cord switches do not have a neutral wire, which means you can't replace them with an inexpensive in-line X10 controller such as the LM12W. The neatest solution we could come up with was to remove the pull-cord switch entirely. The live and switched wires from the old switch could be connected to an HDM1 two-wire dimmer module inside a plastic enclosure. This plastic enclosure could be mounted in the attic for remote control only. But because we could not access the roof space above our bathroom, we had to admit defeat and re-fit our pull-cord switch.

AUTO PILOT

Installing the X10 lighting system took an afternoon. We could turn off most of the lights from a single switch when leaving the house, and switch the lights on and off from anywhere using the remote control. This was neat, but not breathtaking. We then decided to try a system that would do away with light switches

Welcome home How X10 automated lighting works

1. Someone enters the hallway
2. A wireless motion detector notices them and broadcasts a command to turn the hall light on
3. A plug-in transceiver picks up this signal. It converts the radio signal to one that is sent through the power lines. This power line signal also contains a message to turn on the hall light
4. This signal passes down every power line in the house. Most X10 devices will receive it, decode it and then ignore it as it does not contain any instructions for them
5. The hall light switch also receives the message. As the message was addressed to the hall light, it obeys the command and switches itself on
6. The hall light comes on



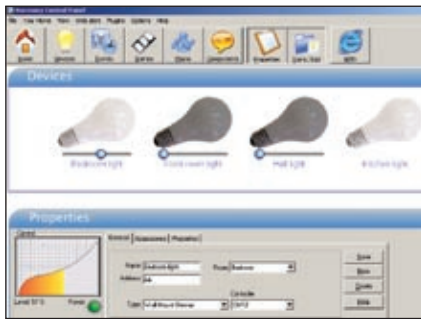
altogether. Our plan was to set up a motion detector that would turn lights on automatically when we entered the room. This would be handy for a bathroom light, but having conceded defeat on that front we decided to fit one in the hall. Ideally, it would turn the hall light on automatically when someone entered through the front door.

For this kind of system, you need an X10-enabled passive infrared (PIR) motion detector. We used an MS13E2, which costs £17 including VAT. It's wireless, runs on two AAA batteries and transmits to your X10 transceiver when it detects motion. The MS13E2 needs to be programmed before you can use it. This is a little fiddly, but the procedure is identical to the one you use when programming X10 remote controls and Stik-A-Switch controllers. We

assigned the detector to channel A2, the channel used by our hall lighting.

Normally the MS13E2 sends a command that turns lights on when it detects motion, then waits for a set period of time before sending a command to turn them off again. You can choose the length of this delay – we set it to eight minutes. A final setting enables you to choose whether you want it to operate when the room is already light. We turned this off, so the detector switches lights on only if they are needed.

With the programming complete, we fixed the detector to the hallway wall near the front door. It worked perfectly, switching the light on when we entered that evening and switching it off again eight minutes later once we'd made a cup of tea and collapsed on the sofa.



▲ iDomus's Harmony software lets you control your lighting and other devices from your PC

GET WITH THE PROGRAM

The automatic light is useful, but once you have your house wired up it's tempting to take on something a little more complicated. We wanted to see how easy it would be to control all our X10 lights and other products using a computer.

To control X10 devices using a PC, you need a CM11U interface, which costs £33 including VAT. It plugs into a power socket, connecting it to all the X10 devices in your system, and talks to your PC using a COM cable. There's also a version with a USB adaptor for modern PCs that lack a COM port. The CM11U can store commands programmed by your computer, so there's no need to leave the PC on all the time. It also requires two AAA batteries.

The CM11U includes a program called ActiveHome. This is old, though, with a cluttered and dated interface. It also crashed our Windows XP PC four times. We'd recommend that anyone installing X10 equipment should

spend a little extra on more modern software. We tried iDomus's Harmony Professional, which is available in a kit with the CM11U.

Harmony's interface is a world away from that of ActiveHome. Icons represent each device in the house, so you can click on lights to turn them on and off, or drag a slider to dim them. These icons are enormous by default, but you can make them smaller. The software lets you set 'scenes' such as turning all the kitchen lights on, which you can then activate with one command. You can also set schedules, so lights turn on every weekday morning or turn off after you have left the house.

We set up a schedule to turn off all the lights in the flat at 3am. Then, in a flash of inspiration, we connected our coffee maker to a plug-in X10 switch so it would start brewing at 7am and turn off again at 8.30. That's progress. These events are programmed into the CM11U interface so they run even when the computer is turned off.

Armed with this computer interface, you can make more complicated use of infrared detectors. As an experiment, we set one up in the hall outside the flat and assigned it to channel A7. None of the lights in the flat was set to this channel, so the detector wouldn't turn them on and off. Instead, we set the Harmony software to perform a sequence of actions when it detected an on signal from A7. The hall light was turned on, followed a minute or two later by the other house lights.

WHAT'S NEXT?

Once you've started automating your home, the chances are you'll think of more and more tasks

that could be made simpler with a little help from your PC. If you have Windows XP Media Center Edition, you can get a plug-in that enables you to control the Harmony software by remote control from your sofa. Alternatively, you could fit a touch-screen display that controls your entire home from the living room. Finally, X10 can be integrated with central heating systems and even burglar alarms.

Our flat of the future now has a full X10 lighting system, as well as a media server that streams a library of 200 CDs to players in the living room, bedroom and kitchen. With a little more time and money, you could set up a similar system for video files and DVDs. If you really want to splash out, you can even automate your cleaning, cooking and gardening – see the 'Tomorrow's home' box below. We're still some way from the Holy Grail of a system that makes tea and toast every morning, but maybe next year? ☞

USEFUL LINKS

UK supplier of X10 and other automation equipment
www.simplyautomate.co.uk

UK home automation community
www.automatedhome.co.uk

Makers of Harmony home automation software
www.idomus.co.uk

Makers of Roomba and Scooba domestic robots
www.irobot.com

Tomorrow's home Can you have a labour-saving home today?

Automating your home lighting is impressive, but there are more arduous tasks in the home than flicking light switches every so often. So how feasible would it be to build a truly labour-saving home?

CAN MY HOUSE CLEAN ITSELF?

Short of coating every surface in your home with Teflon, there's no way to prevent occasional spills or damage to your furniture. At the very least, though, you could get a robot to do the vacuum cleaning. The iRobot corporation makes a range of Roomba robotic vacuum cleaners, the cheapest of which starts at around £150 including VAT. The Roomba discovery comes with a remote control and a charging system and virtual wall units that enable you to trap it in one room. It's even got a friend, the Scooba, that mops hard floors.



▲ Put your feet up while the Roomba robot vacuum cleaner hovers under them

CAN IT HELP IN THE KITCHEN?

We managed to set up an automatic coffee maker using a plug-in X10 switch and a filter coffee machine. A similar system could start a washing machine or tumble drier.

If you have deep pockets, though, you can go much further. LG makes a range of internet-enabled home appliances, including a washing machine that can be turned on over the web. The GRD-267DTU fridge freezer has a 15" touch-screen display with a built-in TV tuner and MP3 player. It's even got an electronic nutrition guide, which will come in handy now that you never need to lift a finger around the house again. For more information, visit www.lginternetfamily.co.uk.

WHAT ABOUT THE GARDENING?

Some people enjoy gardening; others are content to sit on the sofa while nature takes its course and their pristine pastures turn into a primeval swamp. If you're house-proud but lazy, you could always get a robot to do the work. The Robomow, which costs £745 including VAT, will zig-zag across your lawn until it's all neat and tidy. Alternatively, the wonderfully named Mowbot Deluxe will take a tour of your garden every so often, keeping the grass short. It costs £1,325 including VAT.

I'M BORED. ENTERTAIN ME!

There are loads of ways to build an entertainment system into your home. A good start would be a Windows XP Media Center



▲ LG makes a range of intelligent kitchen appliances, including a fridge with integrated TV

system, enabling you to watch and record TV, play music and watch video clips in your living room. If you add a UPnP server program, you can listen to all your music files in other rooms using several media receivers such as the Roku Soundbridge. We did a Media Center PCs round-up in *Shopper* May 2006 and reviewed wireless media players in the December 2005 issue.